

# Memorandum

*Serious drought.  
Help save water!*

To: STRUCTURE POLICY BOARD

Date: November 2, 2016

From: THOMAS A. OSTROM *T.A.O.*  
State Bridge Engineer  
Division of Engineering Services

Subject: **INTERIM TYPE SELECTION GUIDELINES FOR BRIDGE RAILINGS IN CALIFORNIA**

On December 22, 2015, the American Association of State Highway and Transportation Officials (AASHTO) approved a schedule for compliance with the Manual for Assessing Safety Hardware (MASH) for roadside safety hardware devices.

Bridge railings on projects on the State Highway System advertised after December 31, 2019, must comply with MASH criteria for all new permanent installations and full replacements.

Refer to attachment for information on the DES MASH implementation plan for bridge railings, and visit <http://des.onramp.dot.ca.gov/structure-policy-innovation/mash-implementation>.

Under MASH, the minimum height for bridge railings is increasing from 32" to 36" for vehicular traffic railings in Test Level 4 locations. For Test Level 2 locations, the minimum railing height is increasing from 27" to 32" above the roadway for vehicular traffic railings and above the top of the walkway for combination railings.

In the interim, we recommend the following type selection guidelines for projects with bridge railings in the planning and design phases. These guidelines will ensure adequate deck width and railing height during the transition to MASH approved systems.

Test Level 4 Locations (TL-4, speed greater than 45 mph):

Railing Type	Preferred Deck Width	Preferred Railing	Avoid
Solid concrete parapet	1'-9"	Concrete Barrier Type 736 (h = 36") Concrete Barrier Type 742 (h=42")	Concrete Barrier Type 732 (h = 32")
Concrete parapet and metal rail	2'-0"	Concrete Barrier Type 90 (h=36")	
Post and Beam-steel	2'-0"	California ST-70 (h= 46 1/2") California ST-20S (h= 54")	California ST-10 (h=33") California ST-30 (h=32")
Post and Beam-concrete	2'-0"	Concrete Barrier Type 80 (h= 32")	

Test Level 2 Locations (TL-2, speed greater than or equal to 45 mph):

Railing Type	Preferred Deck Width	Preferred Railing
Solid concrete parapet with sidewalk	1'-0" plus 6'-2"min	Concrete Barrier Type 732SW (h=32" above sidewalk)
Post and Beam – concrete with sidewalk	2'-0" plus 6'-2"min	Concrete Barrier Type 80SW (h=32" above sidewalk)
Post and Beam – steel with sidewalk	2'-0" plus 6'-2"min	California ST-40 Bridge Rail (h=42" above sidewalk)

Please revise your internal business practices to include the Bridge Railing Specialist in the transmittal of Advance Planning Studies and General Plans.

For questions, please contact Shannon Post at (916) 227-8070 or [desdesign@dot.ca.gov](mailto:desdesign@dot.ca.gov).

Attachment: MASH Implementation for California Bridge Railings

- c: Shannon Post, Chief, Office of Design and Technical Services, DES  
DES Bridge Design Office Chiefs  
Sudhakar Vatti, Chief, OSFP/SLA  
David Cordova, Office of Standards and Procedures, Division of Design  
Tillat Satter, Bridge Railing Specialist, DES  
Greg Kaderabek, Bridge Railing Specialist, DES

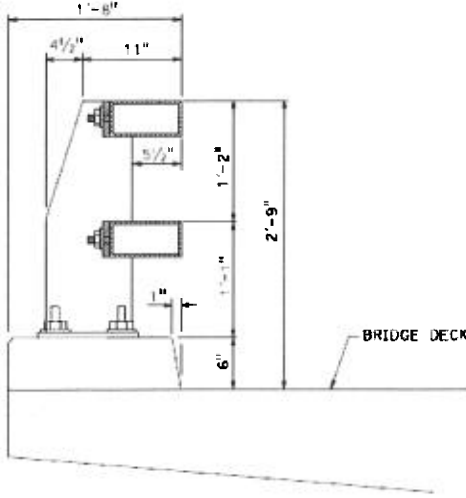
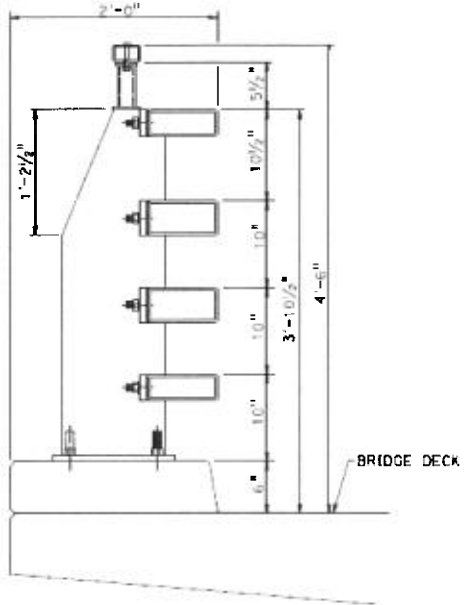
# MASH IMPLEMENTATION FOR CALIFORNIA BRIDGE RAILINGS

## NOVEMBER 2016

### Systems with a TL-4 Crash Test Rating:

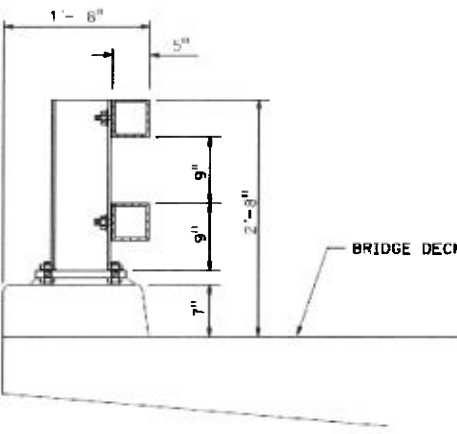
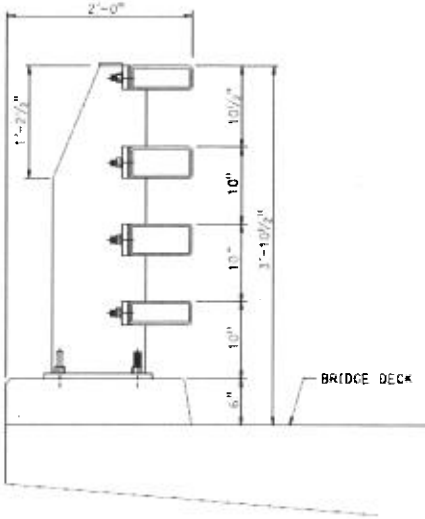
These railings are approved for use in California in a high speed location (regulatory speed limit of greater than 45 mph) or a low speed location (regulatory speed limit of 45 mph or less).

See <http://www.dot.ca.gov/des/oe/construction-contract-standards.html>

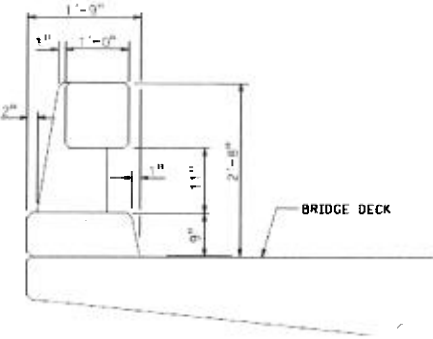
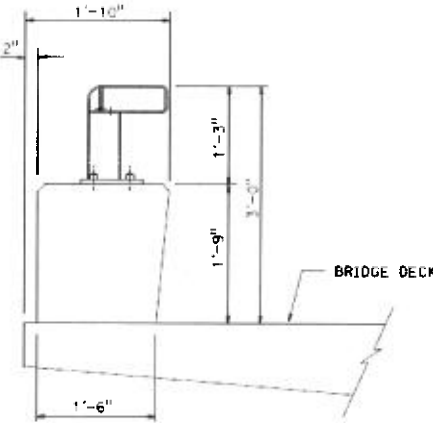
Bridge Railing	Description	MASH Strategy
 <p style="text-align: center;">CALIFORNIA ST-10 BRIDGE RAIL</p>	<p>California ST-10 Bridge Rail NCHRP Report 350 Vehicular Traffic Railing Post and Beam (concrete curb and metal) Hollow structural section (HSS) with 6" concrete curb. Height = 2'-9" Width = 1'-8" Post spacing = 10'-0" max Modifiable for bicycles. Aesthetic see-through rail</p>	<p>No replacement planned</p> <p>No plans for a two beam TL-4 system</p>
 <p style="text-align: center;">CALIFORNIA ST-20S BRIDGE RAIL</p>	<p>California ST-20S Bridge Rail NCHRP Report 350 Combination Traffic Railing (vehicular &amp; bicycle) Post and beam (concrete curb and metal) Hollow structural section (HSS) with 6" concrete curb. Height = 54" Width = 2'-0" Post spacing = 10'-0" max Aesthetic see-through rail.</p>	<p>Will be replaced by proposed California ST-75 Bridge Rail</p> <p>Caltrans research project to replace with 36" vehicular bridge rail / 42" combination bridge rail (vehicular &amp; bicycle) TL-4 system by 2019</p>

# MASH IMPLEMENTATION FOR CALIFORNIA BRIDGE RAILINGS

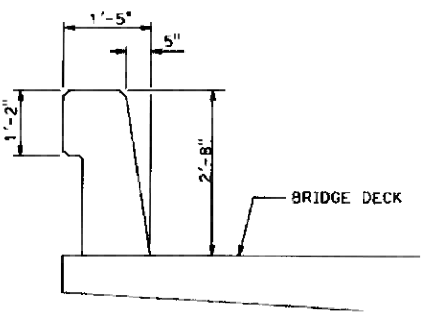
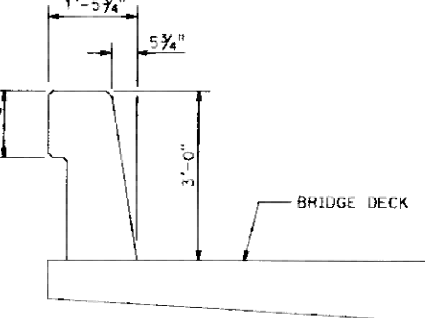
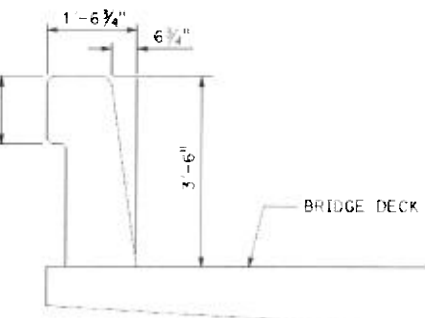
## NOVEMBER 2016

Bridge Railing	Description	MASH Strategy
 <p style="text-align: center;">CALIFORNIA ST-30 BRIDGE RAIL</p>	<p>California ST-30 Bridge Rail NCHRP Report 350 Vehicular Traffic Railing Post and Beam (concrete curb and metal) Hollow structural section (HSS) with 7" concrete curb Height = 2'-8" Width = 1'-8" Post spacing = 10'-0" max Modifiable for bicycles. Aesthetic see-through rail.</p>	<p>No replacement planned</p> <p>No plans for a two beam TL-4 system</p>
 <p style="text-align: center;">CALIFORNIA ST-70 BRIDGE RAIL</p>	<p>California ST-70 Bridge Rail NCHRP Report 350 Combination Traffic Railing (vehicular &amp; bicycle) Post and beam (concrete curb and metal) Hollow structural section (HSS) with 6" concrete curb. Height = 3'-10 1/2" Width = 2'-0" Post spacing = 10'-0" max Aesthetic see-through rail</p>	<p>Will be replaced by proposed California ST-75 Bridge Rail</p> <p>Caltrans research project to replace with 36" vehicular bridge rail / 42" combination bridge rail (vehicular &amp; bicycle) TL-4 system by 2019</p>

**MASH IMPLEMENTATION FOR CALIFORNIA BRIDGE RAILINGS**  
**NOVEMBER 2016**

Bridge Railing	Description	MASH Strategy
 <p style="text-align: center;">CONCRETE BARRIER TYPE 80</p>	<p>Concrete Barrier Type 80  NCHRP Report 350  Vehicular Traffic Railing  Post and beam (concrete)  Concrete with 9" curb  Height = 32"  Width = 1'-9".  Post spacing = 6'-6" max  Modifiable for bicycles.  Aesthetic see-through rail.</p>	<p>Will be replaced by proposed Concrete Barrier Type 85</p> <p>Caltrans research project to replace with 36" vehicular bridge rail/42" combination bridge rail (vehicular &amp; bicycle) TL-4 system by 2019</p>
 <p style="text-align: center;">CONCRETE BARRIER TYPE 90</p>	<p>Concrete Barrier Type 90  NCHRP Report 350  Vehicular Traffic Railing  Concrete parapet and metal rail.  Height = 36"  Width = 1'-8" + 2" clear to edge of deck  Post spacing = 10'-0" max.  Modifiable for bicycles.  Aesthetic see-through rail.</p>	<p>No replacement planned by Caltrans.</p>

**MASH IMPLEMENTATION FOR CALIFORNIA BRIDGE RAILINGS**  
**NOVEMBER 2016**

Bridge Railing	Description	MASH Strategy
 <p>CONCRETE BARRIER TYPE 732</p>	<p>Concrete Barrier Type 732  NCHRP Report 350  Vehicular Traffic Railing  Solid concrete barrier.  Height = 32"  Width = 1'-5"  Modifiable for bicycles.</p>	<p>No replacement planned</p>
 <p>CONCRETE BARRIER TYPE 736</p>	<p>Concrete Barrier Type 736  NCHRP Report 350  Vehicular Traffic Barrier  Solid concrete barrier.  Height = 36"  Width = 1'-5 3/4"  Modifiable for bicycles.</p>	<p>Replacement planned based on TTI Type SSTR(MASH)</p> <p>Height=36"</p>
 <p>CONCRETE BARRIER TYPE 742</p>	<p>Concrete Barrier Type 742  NCHRP Report 350  Combination Traffic Barrier (vehicular &amp; bicycle)  Solid concrete barrier.  Height = 42"  Width = 1'-6 3/4"</p>	<p>Replacement planned based on TTI Type SSTR(MASH)</p> <p>Height=42"</p>

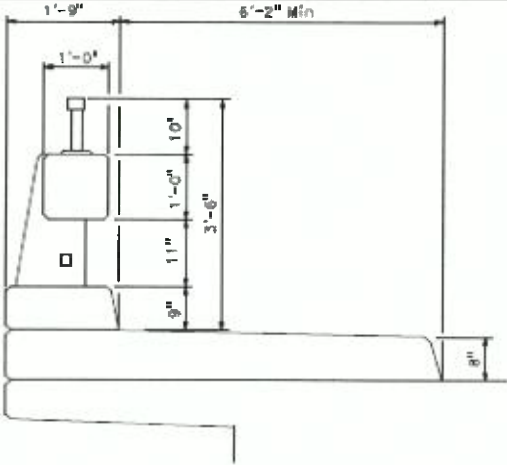
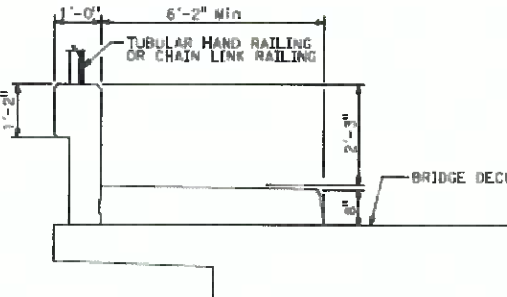
# MASH IMPLEMENTATION FOR CALIFORNIA BRIDGE RAILINGS

## NOVEMBER 2016

### Systems with a TL-2 Crash Test Rating:

These railings are approved for use in California in a low speed location only (regulatory speed limit of 45 mph or less).

See <http://www.dot.ca.gov/des/oe/construction-contract-standards.html>

Bridge Railing	Description	MASH Strategy
 <p style="text-align: center;"><u>CONCRETE BARRIER TYPE 80SW</u></p>	<p>Concrete Barrier Type 80SW NCHRP Report 350 Combination Traffic Railing (vehicular &amp; pedestrian) Post and beam. Concrete with tubular hand rail, 8" curb and integral raised sidewalk. Height = 32" above top of sidewalk plus tubular hand railing. Width = 1'-9" parapet plus sidewalk. Post spacing = 6'-8" max Aesthetic see-through rail</p>	<p>Will be replaced by proposed Concrete Barrier Type 85SW</p>
 <p style="text-align: center;"><u>CONCRETE BARRIER TYPE 26</u></p>	<p>Concrete Barrier Type 26 Combination Traffic Railing (vehicular &amp; pedestrian) Concrete with tubular hand railing or chain link railing, 8" curb and integral raised sidewalk. Height = 27" above top of sidewalk plus tubular hand railing or chain link railing. Width = 1'-0" parapet plus sidewalk</p> <p style="color: red;">ARCHIVED NOT APPROVED FOR NEW CONSTRUCTION</p>	<p>Replaced by Concrete Barrier Type 732SW (MASH)</p> <p>Concrete Barrier Type 26 will be archived, January 2017</p>

**MASH IMPLEMENTATION FOR CALIFORNIA BRIDGE RAILINGS**  
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Bridge Railing	Description	MASH Strategy
<p>CONCRETE BARRIER TYPE 732SW</p>	<p>Concrete Barrier Type 732SW MASH Combination Traffic Railing (vehicular &amp; pedestrian) Solid concrete with tubular hand railing or chain link railing, 8" curb and integral raised sidewalk. Height = 32" above top of sidewalk plus tubular hand railing or chain link railing. Width = 1'-0" parapet plus sidewalk</p>	<p>MASH compliant</p> <p>Added to Standard Plans January 2017.</p>
<p>CALIFORNIA ST-40 BRIDGE RAIL</p>	<p>California ST-40 Bridge Rail NCHRP Report 350 Combination Traffic Railing (vehicular &amp; pedestrian) Post and beam. Hollow structural section (HSS) with 8" concrete curb and integral raised sidewalk. Height = 42" above top of sidewalk. Width = 1'-10" parapet plus sidewalk Post spacing = 8'-0" max Aesthetic see-through rail.</p>	<p>Will be replaced by proposed California ST-75SW Bridge Rail.</p>



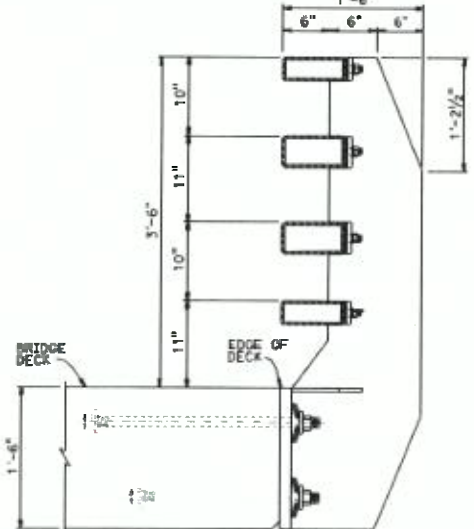
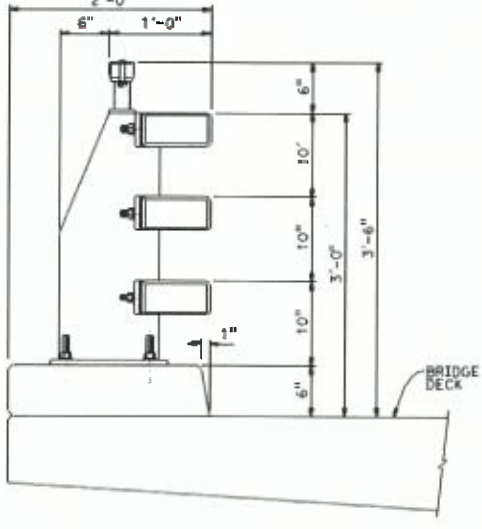
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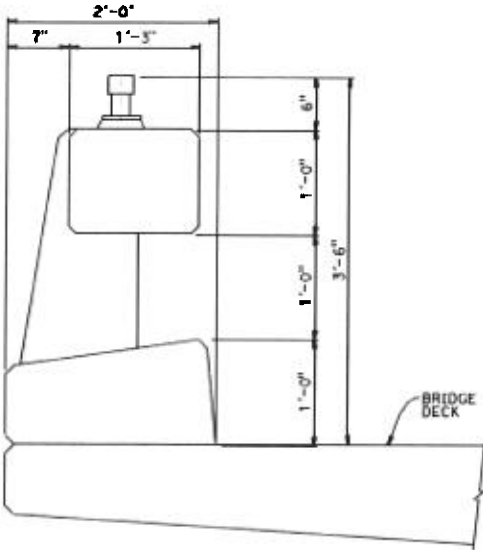
### Systems under development

These railing systems are currently under development for use in California.

See <http://www.dot.ca.gov/research/operations/roadsidesafety/index.htm>

Bridge Railing	Description	MASH Strategy
 <p>CALIFORNIA ST-70SM BRIDGE RAIL</p>	<p>California ST-70SM <b>MASH TL-4</b> Combination Traffic Railing (vehicular &amp; bicycle [w/modification of 2 of 4 clear openings]) Post and beam (all metal) Hollow structural section (HSS) side-mounted (no curb). Height = 42" Width = 1'-6" (beyond EOD of deck slab) Post spacing = 10'-0" Aesthetic see-through rail</p> <p><b>PENDING APPROVAL</b></p>	<p>Testing complete.</p>
 <p>CALIFORNIA ST-75 BRIDGE RAIL</p>	<p>California ST-75 Bridge Rail <b>MASH TL-4</b> Combination Traffic Railing (vehicular &amp; bicycle) Post and beam (concrete curb and metal) Hollow structural section (HSS) with 6" concrete curb. Height = 36" Width = 2'-0" Post spacing = 10'-0" Aesthetic see-through rail.</p>	<p>Caltrans research project for 36" vehicular bridge rail / 42" combination bridge rail (vehicular &amp; bicycle) TL-4 system by 2019.</p> <p>Design complete.</p>

**MASH IMPLEMENTATION FOR CALIFORNIA BRIDGE RAILINGS**  
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Bridge Railing	Description	MASH Strategy
 <p style="text-align: center;"><b>CONCRETE BARRIER TYPE 85</b></p>	<p>Concrete Barrier Type 85  MASH TL-4  Vehicular Traffic Railing  Post and beam  Concrete with 12" curb  Height = 36"  Width = 2'-0"  Post spacing = 10'-0" max  Modifiable for bicycles (height &amp; clear openings)  Aesthetic see-through rail</p>	<p>Caltrans research project for 36" vehicular bridge rail/42" combination bridge rail (vehicular &amp; bicycle) TL-4 system by 2019.</p> <p>Design complete.</p>